

Serial No. 10/765,192
November 4, 2005
Reply to the Office Action dated August 5, 2005
Page 6 of 11

REMARKS/ARGUMENTS

Claims 1 and 4-13 are pending in this application. By this Amendment, Applicants amend claims 1, 4, 5, and 9-11 and cancel claims 2 and 3.

Claim 1-4, 7-9, 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Islam et al. (U.S. 6,812,552) in view of Wang et al. (U.S. 6,872,591). Claims 5, 6, 10 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Islam et al. in view of Wang et al., and further in view of Stork (U.S. 3,622,385). Applicants have canceled claims 2 and 3. Applicants respectfully traverse the rejections of claims 1 and 4-13.

Claim 1 has been amended to recite:

"A process for fabricating a leadless plastic chip carrier, comprising:
selectively etching at least a first surface of a leadframe strip to partially define at least a plurality of contact pads and a die attach pad;
selectively plating at least one layer of metal on a second surface of said leadframe strip, on an undersurface of at least said plurality of contact pads and said die attach pad;
selectively plating at least one layer of metal on said first surface of said leadframe strip including selectively plating said at least one layer of metal on only a peripheral portion of said die attach pad and plating said at least one layer of metal on a surface of said plurality of contact pads for facilitating wire bonding;
mounting a semiconductor die on said first surface, on the partially defined die attach pad;
wire bonding said semiconductor die to ones of said plurality of contact pads;
encapsulating said wire bonds and the semiconductor die in a molding material such that said molding material covers a first portion of said die attach pad and first portions of said plurality of contact pads;
selectively etching a second surface of said leadframe strip to define a second portion of said contact pads and a second portion of said die attach pad by etching said second surface with said at least one layer of metal resisting etching; and
singulating said leadless plastic chip carrier from said leadframe strip." (emphasis added)

Serial No. 10/765,192
November 4, 2005
Reply to the Office Action dated August 5, 2005
Page 7 of 11

Claim 9 has been amended to recite:

"A process for fabricating a leadless plastic chip carrier, comprising:
selectively etching a first surface and a second surface of a leadframe strip to define at least a plurality of contact pads and a die attach pad joined together by remaining portions of metal between etched away portions;
selectively plating at least one layer of metal on said first surface of said leadframe strip and on a second surface of said leadframe strip, on an undersurface of at least said plurality of contact pads and said die attach pad;
mounting a semiconductor die on said first surface, on the die attach pad;
wire bonding said semiconductor die to ones of said plurality of contact pads;
encapsulating said wire bonds and the semiconductor die in a molding material such that said molding material covers a first portion of said die attach pad and first portions of said plurality of contact pads;
further selectively etching to remove said remaining portions of metal between said etched away portions to isolate said plurality of contact pads and said die attach pad; and
singulating said leadless plastic chip carrier from said leadframe strip."

With the unique combination of features and method steps recited in Applicants' claims 1 and 9, including "selectively plating at least one layer of metal on said first surface of said leadframe strip including selectively plating said at least one layer of metal on only a peripheral portion of said die attach pad and plating said at least one layer of metal on a surface of said plurality of contact pads for facilitating wire bonding," "selectively etching a first surface and a second surface of a leadframe strip to define at least a plurality of contact pads and a die attach pad joined together by remaining portions of metal between etched away portions" and "further selectively etching to remove said remaining portions of metal between said etched away portions to isolate said plurality of contact pads and said die attach pad," Applicants have been able to provide a process for fabricating a leadless plastic chip carrier in which the leadframe strip is prepared and pre-plated with etch-resist prior to assembly of the leadless plastic

Serial No. 10/765,192
November 4, 2005
Reply to the Office Action dated August 5, 2005
Page 8 of 11

chip carrier (prior to mounting the semiconductor die to the die attach pad). Thus, the plating steps are carried out during manufacture of the leadless strip rather than during assembly of the leadless plastic chip carrier. The contact pads and die attach pad of the present invention improve motherboard assembly, allowing for better solder assembly to the motherboard and reduced stresses at the solder joints to the motherboard. This is accomplished while maintaining improved package density, thermal performance and electrical performance over traditional QPF packages (see, for example, paragraphs [0009] and [0010] on page 3 of the originally filed specification).

The Examiner alleged that Islam et al. teaches all of the features and method steps recited in Applicants' claims 1 and 9, except for the chip carrier being a plastic chip carrier. The Examiner further alleged that Wang et al. discloses, in line 50 of col. 58, that "the conductive terminals can be configured so that the assembly is a surface mount technology package such as a plastic leadless chip carrier." Thus, in the second full paragraph on page 3 of the outstanding Office Action, the Examiner concluded that it would have been obvious "to have modified the chip carrier of Islam et al. by utilizing a plastic chip carrier for the purpose of being no more metal to cut through and no other problems associated with cutting plastic and metal combination."

Applicants' claim 1 has been amended to recite the steps of "selectively plating at least one layer of metal on said first surface of said leadframe strip including selectively plating said at least one layer of metal on only a peripheral portion of said die attach pad and plating said at least one layer of metal on a surface of said plurality of contact pads for facilitating wire bonding."

In contrast, Islam et al. teaches only the plating of a layer of metal on the entire die attach pad. Islam et al. neither teaches nor suggests any steps of selectively plating any layer of metal on only a peripheral portion of the die attach pad, and certainly fails to teach or suggest the steps of "selectively plating at least one layer of metal on said first surface of said leadframe strip including selectively plating said at least one layer of metal on only a peripheral portion of said die attach pad and plating

Serial No. 10/765,192
November 4, 2005
Reply to the Office Action dated August 5, 2005
Page 9 of 11

said at least one layer of metal on a surface of said plurality of contact pads for facilitating wire bonding" as recited in Applicants' claim 1.

Applicants' claim 9 has been amended to recite the steps of "selectively etching a first surface and a second surface of a leadframe strip to define at least a plurality of contact pads and a die attach pad joined together by remaining portions of metal between etched away portions" and "further selectively etching to remove said remaining portions of metal between said etched away portions to isolate said plurality of contact pads and said die attach pad."

In contrast, Islam et al. teaches etching of only a first side of a leadframe strip prior to mounting the semiconductor die, wire bonding and encapsulating. Islam et al. fails to teach or suggest any further step of etching a second side of a leadframe, and certainly fails to teach or suggest the steps of "selectively etching a first surface and a second surface of a leadframe strip to define at least a plurality of contact pads and a die attach pad joined together by remaining portions of metal between etched away portions" and "further selectively etching to remove said remaining portions of metal between said etched away portions to isolate said plurality of contact pads and said die attach pad" as recited in Applicants' claim 9.

Wang et al. was relied upon to allegedly cure a deficiency of Islam et al. However, Wang et al. fails to teach or suggest the steps of "selectively plating at least one layer of metal on said first surface of said leadframe strip including selectively plating said at least one layer of metal on only a peripheral portion of said die attach pad and plating said at least one layer of metal on a surface of said plurality of contact pads for facilitating wire bonding" as recited in Applicants' claim 1, or the steps of "selectively etching a first surface and a second surface of a leadframe strip to define at least a plurality of contact pads and a die attach pad joined together by remaining portions of metal between etched away portions" and "further selectively etching to remove said remaining portions of metal between said etched away portions to isolate said plurality of contact pads and said die attach pad" as recited in Applicants' claim 9. Thus,

Serial No. 10/765,192
November 4, 2005
Reply to the Office Action dated August 5, 2005
Page 10 of 11

Applicants respectfully submit that Wang et al. fails to cure the deficiencies of Islam et al. described above.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Islam et al. (U.S. 6,812,552) in view of Wang et al. (U.S. 6,872,591).

Stork was relied upon to allegedly cure deficiencies of Islam et al. and Wang et al. However, Stork fails to teach or suggest the steps of "selectively plating at least one layer of metal on said first surface of said leadframe strip including selectively plating said at least one layer of metal on only a peripheral portion of said die attach pad and plating said at least one layer of metal on a surface of said plurality of contact pads for facilitating wire bonding" as recited in Applicants' claim 1, or the steps of "selectively etching a first surface and a second surface of a leadframe strip to define at least a plurality of contact pads and a die attach pad joined together by remaining portions of metal between etched away portions" and "further selectively etching to remove said remaining portions of metal between said etched away portions to isolate said plurality of contact pads and said die attach pad" as recited in Applicants' claim 9. Thus, Applicants respectfully submit that Stork fails to cure the deficiencies of Islam et al. and Wang et al. described above.

Accordingly, Applicants respectfully submit that Islam et al., Wang et al. and Stork, applied alone or in combination, fail to teach or suggest the unique combination and arrangement of elements recited in Applicants' claims 1 and 9.

In view of the foregoing amendments and remarks, Applicants respectfully submit that Claims 1 and 9 are allowable. Claims 4-8 and 10-13 depend upon claims 1 and 9, and are therefore allowable for at least the reasons that claims 1 and 9 are allowable.

In view of the foregoing amendments and remarks, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

Serial No. 10/765,192
November 4, 2005
Reply to the Office Action dated August 5, 2005
Page 11 of 11

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

Date: November 4, 2005


Attorneys for Applicants

Joseph R. Keating
Registration No. 37,368

Christopher A. Bennett
Registration No. 46,710

KEATING & BENNETT LLP
8180 Greensboro Drive, Suite 850
Tyson's Corner, VA 22102
Telephone: (703) 637-1480
Facsimile: (703) 637-1499